

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently amended) A computer-implemented method for determining one or more properties of an insulating film formed on a substrate, comprising:

obtaining a charge density measurement of the insulating film using a non-contact technique;

obtaining a voltage measurement of a surface voltage potential of the insulating film relative to a bulk voltage potential of the substrate corresponding to the charge density measurement using a non-contact technique;

obtaining a rate of voltage decay of the voltage measurement using a non-contact technique; and

determining the one or more properties of the insulating film using the charge density measurement, the voltage measurement, and the rate of voltage decay, wherein the one or more properties comprise a thickness of the insulating film.

2. (Currently amended) The method of claim 1, wherein the one or more properties further comprise capacitance and resistance.

3. (Currently amended) The method of claim 1, wherein the one or more properties further comprise capacitance and resistance, the method further comprising determining a frequency dependency of a device comprising the insulating film and the substrate in the presence of current leakage through the insulating film using the capacitance and the resistance.

4. (Currently amended) The method of claim 1, wherein the one or more properties further comprise capacitance and resistance, the method further comprising and wherein said determining comprises determining thea thickness of the insulating layer film from the capacitance and the resistance.

5. (Original) The method of claim 1, wherein determining the one or more properties comprises altering the voltage measurement using the rate of voltage decay and using the altered voltage measurement and the charge density measurement to calculate the one or more properties.
6. (Original) The method of claim 1, wherein obtaining a charge density measurement comprises depositing a charge onto a surface of the insulating film, measuring the charge density of the charge, and recording the times at which the depositing and the measuring were performed.
7. (Original) The method of claim 1, wherein obtaining a voltage measurement comprises depositing a charge onto a surface of the insulating film, measuring the voltage, and recording the times at which the depositing and the measuring were performed.
8. (Original) The method of claim 1, wherein obtaining a rate of voltage decay comprises measuring the rate of voltage decay subsequent to obtaining a voltage measurement.
9. (Original) The method of claim 1, wherein obtaining a rate of voltage decay comprises measuring the rate of voltage decay prior to obtaining a voltage measurement.
10. (Original) The method of claim 1, wherein obtaining a rate of voltage decay comprises determining the rate of voltage decay using a theoretical model.
11. (Original) The method of claim 1, wherein obtaining a voltage measurement comprises measuring the voltage in accumulation, depletion, inversion, or a combination thereof.
12. (Currently amended) The method of claim 1, wherein the one or more properties further comprise capacitance, ~~the method further comprising wherein said determining comprises~~ determining ~~thea~~ thickness of the insulating film using the rate of voltage decay and a theoretical model relating leakage to insulating film thickness, and wherein the method further comprises determining a dielectric constant of the insulating film using the capacitance and the thickness.
13. (Currently amended) The method of claim 1, wherein the one or more properties further comprise ~~comprises~~ capacitance, the method further comprising obtaining a different thickness of the insulating film

determined by an additional experimental method and determining a dielectric constant of the insulating film using the capacitance and the different thickness.

14. (Original) The method of claim 1, further comprising altering a parameter of an instrument coupled to a process tool in response to at least one of the one or more properties of the insulating film using a feedback control technique.

15. (Original) The method of claim 1, further comprising altering a parameter of an instrument coupled to a process tool in response to at least one of the one or more properties of the insulating film using a feedforward control technique.

16.-31. (Canceled)

32. (New) A system configured to determine one or more properties of an insulating film formed on a substrate, comprising:

a measurement device configured to perform measurements on the insulating film using a non-contact technique; and

a processor coupled to the measurement device, wherein the processor is configured to:

receive input from the measurement device, wherein the input is responsive to a charge density measurement of the insulating film, a voltage measurement of a surface voltage potential of the insulating film relative to a bulk voltage potential of the substrate corresponding to the charge density measurement, and a rate of voltage decay of the voltage measurement; and

determine the one or more properties of the insulating film using the input, wherein the one or more properties comprise a thickness of the insulating film.

33. (New) The system of claim 32, wherein the one or more properties further comprise capacitance and resistance.

34. (New) The system of claim 32, wherein the one or more properties further comprise capacitance and resistance, and wherein the processor is further configured to determine a frequency dependency of a device comprising the insulating film and substrate in the presence of current leakage through the insulating film using the capacitance and the resistance.
35. (New) The system of claim 32, wherein the one or more properties further comprise capacitance and resistance, and wherein the processor is further configured to determine the thickness of the insulating film from the capacitance and the resistance.
36. (New) The system of claim 32, wherein the processor is further configured to determine the one or more properties by altering the voltage measurement using the rate of voltage decay and using the altered voltage measurement and the charge density measurement to calculate the one or more properties.
37. (New) The system of claim 32, wherein the measurement device is further configured to deposit a charge onto a surface of the insulating film, perform the charge density measurement, and record the times at which the charge was deposited and the charge density measurement was performed.
38. (New) The system of claim 32, wherein the measurement device is further configured to deposit a charge onto a surface of the insulating film, perform the voltage measurement, and record the times at which the charge was deposited and the voltage measurement was performed.
39. (New) The system of claim 32, wherein the measurement device is further configured to measure the rate of voltage decay subsequent to performing the voltage measurement.
40. (New) The system of claim 32, wherein the measurement device is further configured to measure the rate of voltage decay prior to performing the voltage measurement.
41. (New) The system of claim 32, wherein the processor is further configured to determine the rate of voltage decay from the input using a theoretical model.
42. (New) The system of claim 32, wherein the measurement device is further configured to perform the voltage measurement in accumulation, depletion, inversion, or a combination thereof.

43. (New) The system of claim 32, wherein the one or more properties further comprise capacitance, wherein the processor is further configured to determine the thickness of the insulating film using the rate of voltage decay and a theoretical model relating leakage to insulating film thickness, and wherein the processor is further configured to determine a dielectric constant of the insulating film using the capacitance and the thickness.

44. (New) The system of claim 32, wherein the one or more properties further comprise capacitance, wherein the processor is further configured to receive input responsive to a different thickness of the insulating film determined by an additional experimental method, and wherein the processor is further configured to determine a dielectric constant of the insulating film using the capacitance and the different thickness.

45. (New) The system of claim 32, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of an instrument coupled to the process tool in response to at least one of the one or more properties of the insulating film using a feedback control technique.

46. (New) The system of claim 32, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of an instrument coupled to the process tool in response to at least one of the one or more properties of the insulating film using a feedforward control technique.